COMMON INFECTIONS IN THE NURSING HOME

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UNC School of Medicine
Tips on Evaluating, Communicating about, and Treating Suspected Urinary Tract Infections
Case Study: Mrs. Carter

- 84 year old with cognitive impairment
- Decreased appetite, less active
- Family says “she doesn’t seem right”
- Increased frequency/incontinence
- Suprapubic tenderness
- Normal vital signs

Should Mrs. Carter’s urine be checked?
WHAT’S GOING ON WITH MRS. CARTER?

Non-specific symptoms:
• Decreased appetite, less active

Urinary tract-specific symptoms:
• Increased frequency
• Suprapubic tenderness

Collect urine for testing
General Guidelines For Urine Testing

Are any of the following present?

- Fever (at or above 99°F or 1.2°F over baseline) without other cause
- Painful urination
- Blood in urine
- Pain/tenderness along urinary tract
- New/increased frequency or urgency

**Yes**
- Notify health provider
- Send urine for testing

**No**
- Monitor/Assess
- Nursing interventions

If condition worsens or doesn't improve
Urine Sample Collection in Incontinent Nursing Home Residents

Getting an uncontaminated urine sample can be difficult.

• “Clean catch” into sterile container when possible
• Condom catheter for men
• In and out catheterization for incontinent women
Sample Storage and Transport

• Keep sample refrigerated if testing more than 2 hours after collection
• Label with name, date, time, method of collection
### Mrs. Carter’s Urinalysis Results

<table>
<thead>
<tr>
<th></th>
<th>RESULTS</th>
<th>REFERENCE RANGES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BLOOD</strong></td>
<td>1+</td>
<td>Negative</td>
</tr>
<tr>
<td><strong>NITRITE</strong></td>
<td>1+</td>
<td>Negative</td>
</tr>
<tr>
<td><strong>LEUKOCYTE ESTERASE (LE)</strong></td>
<td>3+</td>
<td>Negative</td>
</tr>
<tr>
<td><strong>BACTERIA</strong></td>
<td>3+</td>
<td>None-few/hpf</td>
</tr>
<tr>
<td><strong>WHITE BLOOD CELLS</strong></td>
<td>40-100/hpf</td>
<td>0-5/hpf</td>
</tr>
<tr>
<td><strong>RED BLOOD CELLS</strong></td>
<td>2/hpf</td>
<td>0-5/hpf</td>
</tr>
<tr>
<td><strong>EPITHELIAL CELLS</strong></td>
<td>0-5/hpf</td>
<td>None-few/hpf</td>
</tr>
</tbody>
</table>
How is Mrs. Carter Now?

- Feeling better
- Taking fluids well
- Had bowel movement
- No more tenderness
# Urine Culture Result

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Sensitive (S) or Resistant (R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>R</td>
</tr>
<tr>
<td>Bactrim</td>
<td>R</td>
</tr>
<tr>
<td>Ciprofloxacin (Cipro)</td>
<td>R</td>
</tr>
<tr>
<td>Cefalexin (Keflex)</td>
<td>S</td>
</tr>
<tr>
<td>Nitrofurantoin (Macrodantin)</td>
<td>S</td>
</tr>
<tr>
<td>Gentamycin</td>
<td>S</td>
</tr>
<tr>
<td>Carbapenem</td>
<td>S</td>
</tr>
</tbody>
</table>

>100,000 organisms/ml

*E. coli*

Positive Culture
Back to the Clinical Picture

- Urinary symptoms returned
- Low grade fever 99.2°F
- Antibiotics prescribed

Clinical signs/symptoms+ Positive Culture → Infection
Tips on Evaluating, Communicating about, and Treating Suspected Respiratory Infections
Case 2: Mr. Jackson

- 82 year old, never smoked
- 4 days of illness
- Prominent symptoms are runny nose and sneezing.
- Had sore throat on first two days, now gone.
- Mild, dry cough, the first two days, but now cough has increased and interferes with sleep at night
- No dyspnea
- Energy level normal
# More about Mr. Jackson

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>98.7°F</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>145/85</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>18</td>
</tr>
<tr>
<td>Pulse</td>
<td>75</td>
</tr>
<tr>
<td>Pulse ox</td>
<td>97%</td>
</tr>
<tr>
<td>Mental status</td>
<td>Baseline</td>
</tr>
<tr>
<td>Lung exam</td>
<td>Clear</td>
</tr>
</tbody>
</table>

1. What is the most likely diagnosis?
2. What treatment(s) are indicated?
What can be done for viral respiratory infection?

TO DO:

- Reassure patient and/or family
- Monitor vital signs and worsening signs or symptoms
- Encourage fluids and rest
- Acetaminophen or NSAIDS for fever/pain
- Nasal saline spray/humidified air for congestion
- Consider cough medicine
“Sinus” and “Sinusitis”

- When people say they have “sinus” they don’t usually mean acute sinusitis.

- **Acute sinusitis** requires: purulent nasal drainage plus nasal obstruction and/or facial pain, pressure, or fullness, and (usually) fever.
  - Most is viral, a minority are bacterial
  - Proven effective: nasal steroids
  - Unproven effectiveness: antibiotics [but still they are overused]
Case 3: Mrs. Gallagher

- 78 year old, smoker, COPD, on oxygen (2 L/min)
- 5 days of productive cough
- Increased dyspnea
- Pulse ox 93% (normal 93-95%)
- Temperature 100.0 °F
- Exam: rhinorrhea, nasal congestion, anterior wheezes.
- X-ray: no acute changes

1. What is the most likely diagnosis?
2. What treatment(s) are indicated?
Are Antibiotics Indicated for COPD Exacerbations?

- Cochrane systematic review (2012):
  - large beneficial effects patients admitted to an ICU
  - For outpatients and inpatients, results inconsistent

- Guidelines for COPD exacerbation:
  - Mild disease: start with inhaled bronchodilator, consider oral steroids. If inadequate relief, consider antibiotic
  - Moderate / severe disease → inhaled bronchodilator, oral steroids, and antibiotics
  - Monitor for signs of pneumonia

Influenza in the Nursing Home

- Vaccinate all residents and staff
- Test residents with suspicious symptoms
- Infection control
  - Standard precautions
  - Droplet precautions
- Antiviral treatment
- Antiviral chemoprophylaxis
- Monitor for signs suggesting pneumonia

http://www.cdc.gov/flu/professionals/infectioncontrol/ltc-facility-guidance.htm
Laboratory-Confirmed Influenza Cases, UNC Hospital Laboratories, 2012-2017
“Influenza testing should occur when any resident has signs and symptoms of influenza-like illness.”

CDC defines influenza-like condition as an unexplained illness characterized by:

• Fever > 100°F, 37.8°C
  PLUS
• cough and/or sore throat

for details on lab testing, check CDC website

http://www.cdc.gov/flu/professionals/infectioncontrol/ltc-facility-guidance.htm
Dealing with a Flu Outbreak

• Definition: at least one laboratory confirmed case plus one other case that looks like the flu

• If outbreak occurs, implement:
  ✓ Daily active surveillance of residents, health care personnel and visitors.
  ✓ Droplet precautions for all residents with suspected or confirmed influenza
  ✓ Antiretroviral treatment for all cases
  ✓ Antiviral chemoprophylaxis for all non-ill residents, continuing at least 2 wks (until 7 days after last case)
  ✓ Review material on CDC website:
    http://www.cdc.gov/flu/professionals/infectioncontrol/ltc-facility-guidance.htm
Pneumonia
What Clinical Signs Suggest Pneumonia?

• Abnormal vital signs
  – Fever
  – Respiratory rate > 25 (90% sensitive, 90% specific)
  – Tachycardia
• Pulse ox drop of >3% (about 75% sensitive and 75% specific)
• New localized rales on physical exam
• Acute delirium

Three Main Types of Pneumonia - 1

- **Aspiration pneumonia**
  - Most common type of pneumonia in NH patients
  - Affects 300,000 – 600,000 Americans annually
  - Oral bacteria predominate
Aspiration Happens Frequently

- Dysphagia affects up to 68% of elderly nursing home residents
- Small volume aspiration is frequent
- Sign: cough after swallowing
- Usually is cleared without development of pneumonia
Aspiration Pneumonitis vs Pneumonia

• Controversial area
  – When to diagnose?
  – When to treat?
  – How to prevent?
  – How best to treat?

• **Pneumonitis** – inflammation without infection

• **Pneumonia** – infection by a microorganism
When Is Aspiration Most Hazardous?

- Infection and heavy colonization in mouth
- Solid aspirate
- High volume
- Very ill and/or dying patient
Can Aspiration Pneumonia be Prevented?

• Thickened liquids do not reduce aspiration or pneumonia
• Posture adjustment (e.g. chin tuck) – limited benefit
• Diet modification leads to poor intake and greater use of supplements

Bottom line: Individualize, but do not torture patient with measures that may not work
Reducing Aspiration Pneumonia Risk

“Regardless of prescribed diet consistencies, all residents continuously produce saliva, which is routinely swallowed between meals and at night. Consequently, many programs designed to prevent aspiration pneumonia concentrate on improved oral hygiene, which is definitely a modifiable risk factor, rather than dysphagia as such. They also modify medication regimens, because antipsychotics and sedatives significantly increase the risk of aspiration pneumonia.”

Three Main Types of Pneumonia - 2

- Aspiration pneumonia
  - Most common type of pneumonia in NH patients
  - Affects 300,000 – 600,000 Americans annually
  - Oral bacteria predominate

- Other bacterial pneumonia
  - Often spontaneous, can follow viral infection
  - Variety of organisms
Three Main Types of Pneumonia - 3

- **Aspiration pneumonia**
  - Most common type of pneumonia in NH patients
  - Affects 300,000 – 600,000 Americans annually
  - Oral bacteria predominate

- **Other bacterial pneumonia**
  - Often spontaneous, can follow viral infection
  - Variety of organisms

- **Viral pneumonia**
  - Least common
  - Example -- influenza
McGeer Criteria for Pneumonia

1. Chest x-ray interpretation demonstrates “pneumonia or the presence of a new infiltrate”
2. At least 1 of the following: new or increased cough; new or increased sputum; O2 sat <94% or down by >3% on room air; new or changed lung exam abnormalities; pleuritic pain; respiratory rate ≥25
3. New fever, leukocytosis; delirium, or functional decline

# Summary: The Five Major Types of Respiratory Tract Infections

<table>
<thead>
<tr>
<th>Infection Type</th>
<th>Cause</th>
<th>Common Symptoms</th>
<th>Distinguishing Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Cold</td>
<td>Virus</td>
<td>Nasal congestion/sneezing</td>
<td>Nasal symptoms Normal vitals (+/- fever) Unchanged lung exam</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sore throat</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry cough</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>+/- fever</td>
<td></td>
</tr>
<tr>
<td>Acute bronchitis</td>
<td>Virus</td>
<td>Cough (+/- sputum) +/- Fever</td>
<td>Normal chest X-ray Normal vitals (+/- fever)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Bacteria or Virus</td>
<td>Cough (+ sputum) Pleuritic chest pain Fever</td>
<td>Abnormal vital signs Abnormal lung exam Infiltrate on chest X-ray Mental status changes</td>
</tr>
<tr>
<td>Influenza-like illness</td>
<td>Virus</td>
<td>Sore throat</td>
<td>Chills Body aches Malaise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry cough</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fever</td>
<td></td>
</tr>
<tr>
<td>COPD exacerbation</td>
<td>Virus or bacterial</td>
<td>Cough (+/- sputum) +/- Fever</td>
<td>Normal chest X-ray Normal vitals (+/- fever)</td>
</tr>
</tbody>
</table>
Tips on Evaluating, Communicating about, and Treating Suspected Skin Infections
Did You Know?

• “Skin infection” is the third most common reason for antibiotic use (and overuse) in the nursing home
• There are several criteria to help guide decision-making and communication about suspected skin infections
• All wounds will have bacteria, your job is to decide whether a wound is colonized, superficially infected, or has deep tissue infection
Case 4: Mrs. Simpson

- Chronic pressure ulcer without change in size for 4 weeks
- Increasing clear drainage, debris, and odor
- No change in vitals or clinical status

Is this wound infected?
“NERDS” Help Identify Superficial Infection

- Nonhealing
- Exudate (increased drainage)
- Red, friable, bleeding wound bed
- Debris (yellow film)
- Smell (increased)

Adv Skin Wound Care 2006;19:447-61
How to Treat A Superficially Infected Wound

1. Debride to remove dead tissue and biofilm
2. Apply topical antimicrobials
   • Silver compounds
   • Cadexomer iodine
3. Use dressings that balance moisture

Assess the wound regularly and discontinue topical antibiotics once the wound is in bacterial balance.

Clinical Interventions in Aging 2009:4; 269-287.
Basic Nursing Procedures are Crucial to Wound Healing

• Identify and minimize causes of pressure and potential skin breakdown
• Protect wound from urine and feces
• Treat underlying conditions (diabetes, poor nutrition)
• Follow contact precautions
  • Hand hygiene
  • Gloves and gown use
“STONES” Help Identify Deep Infection

- Size of wound (increased)
- Temperature of wound (increased)
- Os (probes to bone)
- New breakdown
- Edema/Erythema (more than 1 cm)
- Exudate (or profuse drainage)
- Smell (prominent)
“STONES” Help Identify Deep Infection

- **S**ize of wound (increased)
- **T**emperature of wound (increased)
- **O**s (probes to bone)
- **N**ew breakdown
- **E**dema/Erythema (more than 1 cm)
- ✔ **E**xudate (or profuse drainage)
- ✔ **S**mell (prominent)
Signs And Symptoms Suggesting Need For Quick Action

- High fever
- Rigors/Chills
- Hypotension
- Tachycardia

Monitor Vital Signs
A Few Days Later, Wound is Worse

- Size of wound (increased)
- Temperature of wound (increased)
- Os (probes to bone)
- New breakdown
- Edema/erythema (more than 1 cm)
- Exudate (or profuse drainage)
- Smell (prominent)

- Monitor vitals
- Notify provider
- If provider is off site, send a cell phone photo
- Obtain a wound culture
Skin infections are diagnosed by clinical signs and symptoms, while culture results guide antibiotic choice.
The Levine Technique For Deep Fluid Culture

- Cleanse wound, remove debris
- Pre-moisten swab
- Rotate swab over 1 cm of viable tissue with pressure for 5 seconds
- Avoid swabbing dead or pus-filled areas

Levine et al, 1976
McGeer Criteria for Skin or Wound Infection

At least one of the following criteria present:
1. Pus present at a wound, skin, or soft tissue site.
2. New or increasing presence of at least four of the following at the affected site:
   a) Heat
   b) Redness
   c) Swelling
   d) Tenderness and/or pain
   e) Serous drainage
   f) Fever, leukocytosis, delirium, or marked functional decline

Are These Wounds Infected?

- 67 year old PACE participant
- Largely confined to wheelchair due to obesity, arthritis, and weakness from stroke
- Bumped leg 1 week before; had self-treated by cleansing and covering with a band-aid
- Not painful
- Nurse wonders if wound needs an antibiotic
Photo 1 week later after treatment with elevation, xeroform gauze and Tegaderm
83 Year Old Transferred from Hospital After 10 Days of Treatment with Levofloxacin for Cellulitis

On Admission

One Month Later
# Stasis Dermatitis vs. Cellulitis

<table>
<thead>
<tr>
<th><strong>Cellulitis</strong></th>
<th><strong>Stasis Dermatitis</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden onset</td>
<td>Chronic onset</td>
</tr>
<tr>
<td>Unilateral</td>
<td>Bilateral</td>
</tr>
<tr>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td>Hot</td>
<td>Scaling, crusting, itching</td>
</tr>
<tr>
<td>Painful and tender</td>
<td>+/- pain and tenderness</td>
</tr>
<tr>
<td>Swollen</td>
<td>Pitting edema</td>
</tr>
<tr>
<td>+/- Fever</td>
<td>No fever</td>
</tr>
</tbody>
</table>
Is This Acute Red Leg Infected or Not?

• A 71 year old man with a history of CAD s/p CABG
• Hospitalized for right inguinal fold cellulitis, treated with vancomycin and ceftriaxone
• After a few days was afebrile, felt better and WBC normal; however....
• Developed erythema and edema on the right lower extremity between the knee and the ankles
Applying the McGeer Criteria

X Pus present at a wound, skin, or soft tissue site.

Four or more needed:

✓ Heat
✓ Redness
✓ Swelling

+/- Tenderness and/or pain

Serous drainage

Fever, leukocytosis, delirium, or marked functional decline
Diagnosis: Acute Stasis Dermatitis

• Pathophysiology: the combination of right inguinal fold cellulitis near many lymphatic chains and prior vein stripping from his CABG → acute erythema, redness and pain
• Brawny red erythema is common in acute stasis dermatitis.
• Petechiae clue to increased pressure as etiology
Key Point About Suspected Skin Infection

- Skin problems are the #3 reason for antibiotic overuse
- Just because it’s inflamed doesn’t mean it’s infected
- A picture is worth a thousand words
- Know your NERDS, STONES, and McGeer Criteria
- Bilateral is almost never infected
- Elevation often markedly improves erythema and edema
Tips on Evaluating, Communicating about, and Treating Suspected Gastrointestinal Infections
Wide Variety of GI Infections Can Occur

- Acute abdominal problems often needing surgical consultation: diverticulitis, appendicitis, cholecystitis, intra-abdominal abscesses
- Infectious diarrhea – usually viral; can occasionally be caused by bacteria such as *E. coli, Salmonella*, or *Shigella* species
- *Helicobacter pylori* – associated with upper GI distress and peptic ulcer disease
- Norovirus – most common cause of epidemic diarrhea
- *Clostridium difficile* – bacterial infection commonly associated with antibiotic use
Norovirus

- Most common cause of epidemic diarrheal illness
- Cause: virus
- Extremely contagious
- Causes nausea, vomiting, diarrhea & fever for 1-3 days
- Spreads rapidly in nursing homes, schools, and cruise ships
- Virus transmitted by contact such as daily care, shaking hands, and touching contaminated surfaces (e.g., handrails); as well as eating contaminated food or drink
- Prevention:
  - good hand washing
  - isolation of infected persons (including staff)
Case Study: Mrs. Parker

- 74 year old with cognitive impairment
- On antibiotics for urinary infection
- Day 6 of antibiotics:
  - Watery stools
  - Abdominal cramps
  - Fever

STOOL SAMPLE : *C. difficile* toxin +
Clostridium Difficile: an Indicator of Antibiotic Overuse

**Impact**
- Caused close to half a million illnesses in one year.
- Comes back at least once in about 1 in 5 patients who get C. difficile.
- 1 in 11 people 65 and older died within a month of C. difficile infection diagnosis.

**Risk**
- People on antibiotics are 7-10 times more likely to get C. difficile while on the drugs and during the month after.
- Being in healthcare settings, especially hospitals or nursing homes.
- More than 80% of C. difficile deaths occurred in people 65 and older.
Which Antibiotics Pose the Highest Risk of *Clostridium difficile*?

Wenisch et al. *Antimicrob Ag Chemother* 2014; 58(9): 5079-83
Tips on Evaluating, Communicating about, and Treating Suspected Sepsis